# Joint Logistics Over-The-Shore (JLOTS ) Throughput Modeling Tool (JTMT)

for

The Ninth Annual JLOTS /Logistics-from-the-Sea Symposium

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# Agenda

- Program Objective
- JTMT Description
- Program Schedule
- Tasks
  - Use Case
  - Measures of Performance (MOPs)
  - Functions of the Model
- Demonstration

# Program Objective

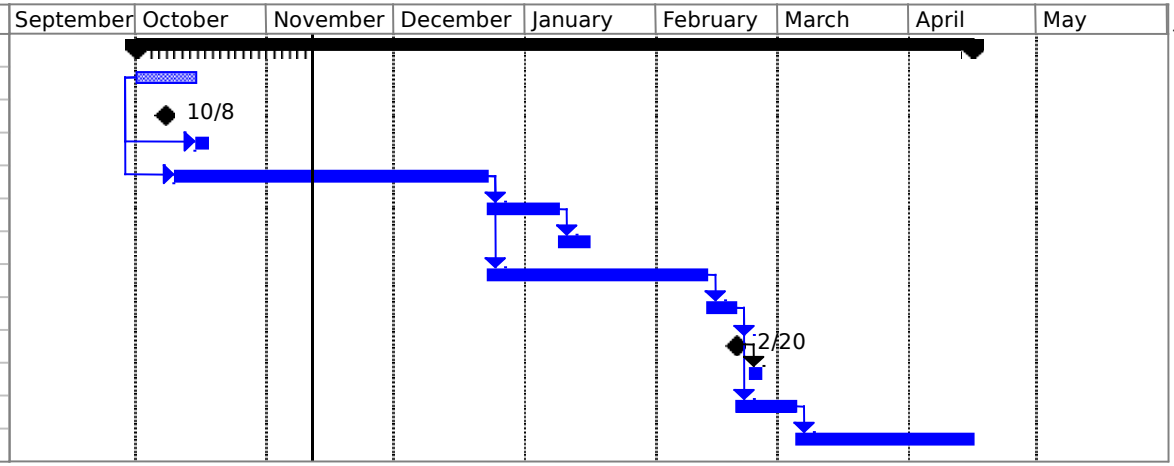
- Develop a JLOTS Throughput Modeling Tool (JTMT) which will allow the planner to examine the dynamics of the process.
  - Identify possible bottlenecks and problems
  - Assess the impact of a dynamic event
  - Plan contingencies for use during execution

# JTMT

- Microsoft-Windows based
- Visualization for easy understanding and presentation
- Discrete Event Simulation of JLOTS timeline
- Algorithms are visual and do not require an understanding of a computer software language
- Will be GCCS-display compliant
- No license or fee for runtime version of TopView

# Program Schedule

| Task Name | September | October | November | December | January | February | March | April | May | June |
|---|---|---|---|---|---|---|---|---|---|---|
| **JTMT** | | | | | | | | | | |
| Use Case | | | | | | | | | | |
| Kickoff Meeting | | | | | | | | | | |
| MOE/MOP | | | | | | | | | | |
| Model Development Iteration 1 | | | | | | | | | | |
| Testing Iteration 1 | | | | | | | | | | |
| Iteration 1 Review | | | | | | | | | | |
| Model Development Iteration 2 | | | | | | | | | | |
| Testing Iteration 2 | | | | | | | | | | |
| Final Delivery | | | | | | | | | | |
| Final Review | | | | | | | | | | |
| Training Development | | | | | | | | | | |
| Training Sessions | | | | | | | | | | |



# Use Case

- **Current list of entities:**
  - Floating Causeway (FC)
  - Elevated Causeway (Modular) (ELCAS(M))
  - Roll On / Roll Off Discharge Facility (RRDF)
  - Army Causeway Ferry
  - Causeway Barge Ferry/Causeway Section Powered (CSP)
  - Improved Navy Lighterage System
  - Mechanical Handling Equipment (MHE)
  - Theater Support Vessel (TSV)/High Speed Vessel (HSV)
  - Logistics Support Vehicle (LSV)
  - Landing Craft Utility (LCU 2000)
  - Fast Sealift Ships (FSS)
  - Large Medium Speed Roll-on Roll-off (LMSR)
  - Maritime Prepositioning Force Ships (MPS)
  - Float On / Float Off (FLO/FLO)
  - Lift On/Lift Off (LO/LO)
  - Break Bulk Cargo
  - Rolling Stock
  - Containerized Cargo
  - Rotary Wing

# Model Functions

The model will:

- Calculate Ship Movements
- Consider cargo unload time at ship
- Consider cycle time from ship to shore
- Consider cargo unload time at the off load point
- Consider beach clearance/throughput time to marshalling yard
- Consider onward movement time (marshalling yard clearance time)
- Consider cargo load time at load point
- Consider cargo handling shift time
- Consider operational readiness rate
- Consider mean time to repair equipment

# Model Development

- As a minimum the user should be able to enter/adjust:
  - Quantity and throughput of pier unloading facilities
  - Ship arrival/departure dates
  - Selectable cargo handling unit arrival/departure dates
  - Selectable cargo handling unit work schedule
  - Offload point throughput capacity
  - Cargo type and quantities
  - Lighterage/watercraft capacity (load and unload times)
  - Lighterage/watercraft speed
  - Selectable lighterage/watercraft type for off load/onload
  - Selectable rotary wing for off load/on load
  - Selectable mechanical handling equipment for offload/onload
  - Selectable tidal ranges
  - Ship distance from shore
  - Sea states
  - Modified surf index
  - Beach gradients

# Measures of Performance

- Identify discriminating, measurable and related Measures of Effectiveness (MOEs) to gauge the effectiveness and efficiencies of the plan.  Current List:
  - Short tons/unit of time
  - Square Feet/unit of time
  - Ship Offload in days
  - Mix of supply types
  - Time to offload
  - Mix of Lighterage

# JTMT Setup

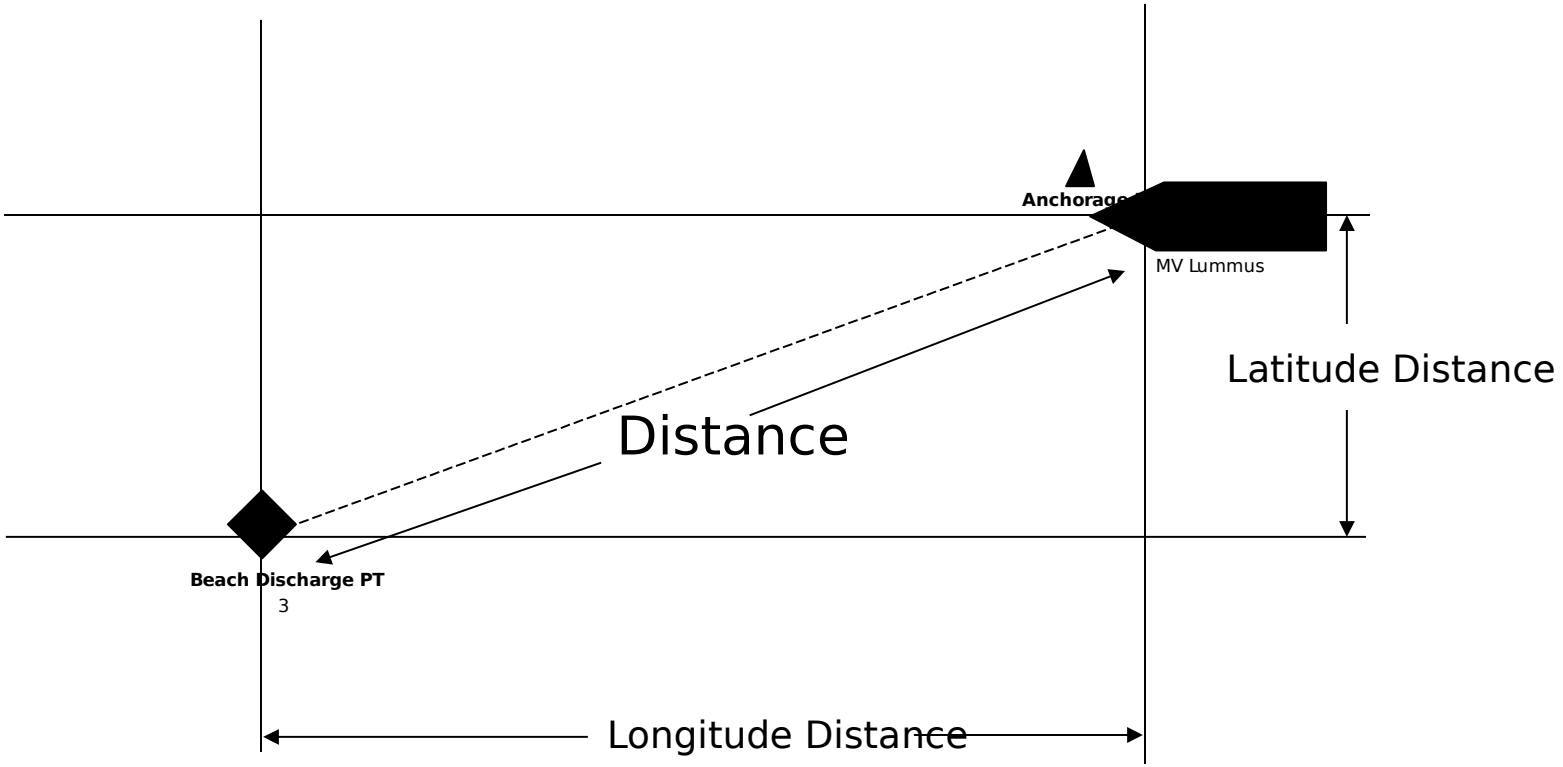
- Map area established by entering latitude and longitude of map corners.
- Each element has a Lat/Long location for computing distance from other elements.
  - Elements are updated after they move.
- Inventory represents the available elements that can be used in the model.
- Lighterage and ships can be activated from inventory and deactivated back to inventory before a simulation run.

# Algorithms

- Distance between locations
- Current
- Matching lighterage to ship
- Matching lighterage to discharge point
- Cargo Transfer
- Beach Gradient
- Sea State
- Modified Surf Index (MSI)

# Distance Between Points

- Use Latitude and Longitude to compute distance and new locations.
  - Uses Great Circle formula



# Movement Components and Cycle Time

A. Time to proceed from near-ship to approach/moor alongside a ship and ready to commence onload

B. Time to onload at the ship

C. Time to cast off from and clear the ship

D. Transit time to the discharge point based on distance and speed.

E. Time to stab the beach, or dock at a discharge point

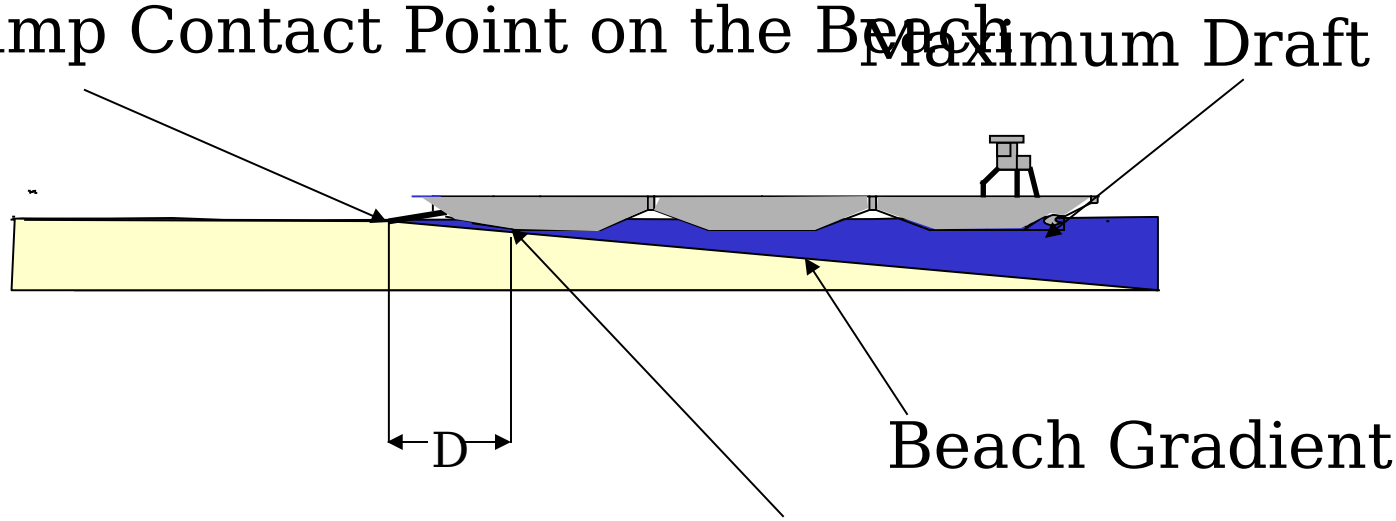
F. Time to offload

G. Time to clear the beach

H. Transit time to the ship based on distance and speed.

I. Factor in Current Speed and Direction

# Beach Gradient




D = distance from contact point and ramp contact poi
Ramp contact point can be maximum of 3ft below sur

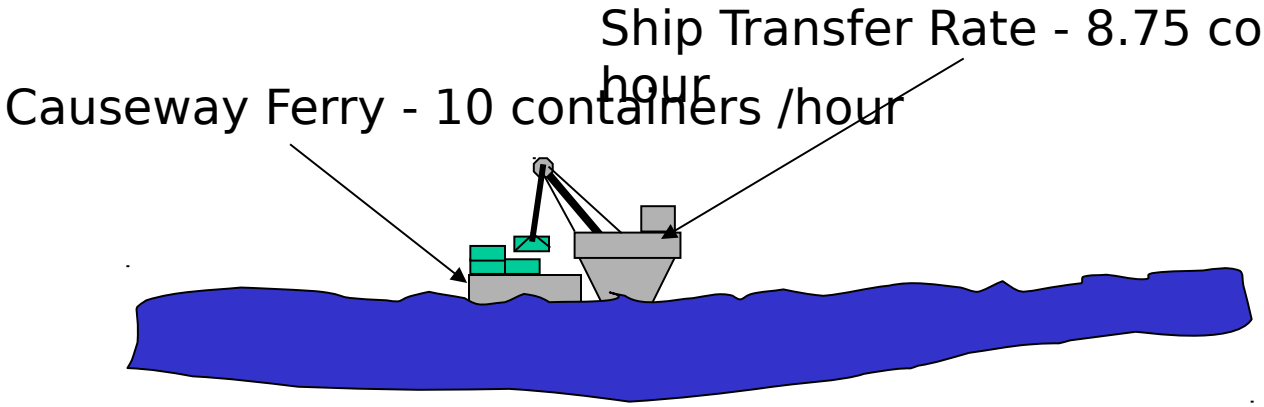
- Used as a go/no-go calculation for beach offload.
- Tide is varied in the simulation from Low to High

# Sea State (based on Pierson-Moskowitz Sea Spectrum)

- Higher Sea States will decrease throughput by a factor of the cargo transfer rate; for each sea state that factor is:
  - Sea States 0/1 (significant wave heights (SWH) up to 1.35 feet) = 1.00 factor
    - There will be no expected degradation in the cargo transfer rate in sea states zero and one
  - Sea State 2/2+ (SWH of 1.35 up to 2.5 feet) = .7 factor
    - There will be a 30% reduction in the cargo transfer rate
  - Sea State 3- (SWH of 2.5 up to 3.25 feet) = .5 factor
    - There will be a 50% reduction in the cargo transfer rate
  - Sea State 3 (SWH of 3.25 up to 5.5 feet) = No Go, a factor of 0.0
- Sea State is dynamically varied during the simulation using a probability of the occurrence of a particular sea state.

# Cargo Transfer

- Currently four cargo types; 1-tracked vehicles, 2-wheeled vehicles, 3-containers and 4-break bulk
- Other than tracked/wheeled vehicles, cargo types are not mixed.
- Cargo Transfer rate is the slower transfer rate of the two elements engaged in loading or unloading based on cargo type.




- Modeled transfer rate is 8.75 containers/hour

# Data Base

- MS Access
- All data parameters to be changed by the active duty operators/planners should be changed in MS Access not in the model.
- Changing data values
  - Cargo Quantities
  - Cargo Transfer Rate
  - Environment
  - Capacities
- Reviewing data
- Data Collection for Performance Measure calculation. (Separate Data Base than data parameter database)

# Software Demonstration

# Questions?